ɔject in Dominican Spanish. *Journal of*
ɔciation 14: 59-67.
ol en Santo Domingo. Buenos Aires:
mericana.
ance Languages, ed. Martin Harris and

Más datos sobre el español en la
go: Ediciones Intec.
ɔsitional accusative in Sardinian: its
sions. In *Linguistic Theory and the*
les Smith and Martin Maiden, 37-75.

sh personal infinitive. *In New analyses*
Vanner and Douglas Kibbee, 201-20.

ew York: Longman.
mbiguation in Puerto Rican Spanish.

el español dominicano: Implicaciones
Caribe, ed. Orlando Alba, 301-318.
e y Maestra.
tting parametric limits on dialectal
341.
nal uses of the accusative *a*. *Hispania*

accusative *a*. *Hispania* 74: 146-156.

Declarative Intonation Patterns in Multiple Varieties of Spanish

Julia Tevis McGory
The Ohio State University

Manuel Díaz-Campos
Indiana University

1. Introduction

Recent efforts have sought to capture the intonational structure of declaratives in Latin American and Peninsular varieties of Spanish using an autosegmental-metrical (AM) model of intonation (Ladd 1996), like that proposed for English by Pierrehumbert (1980). These include a description by Sosa (1999) of multiple Latin and Peninsular varieties, and also more specific descriptions of Castilian Spanish by Face (in press), of Mexican Spanish by Prieto and colleagues (Prieto, van Santen & Hirschberg 1995, Prieto, Shih, & Nibert 1996, Prieto 1998), and of northern Peninsular and Venezuelan Spanish by participants at the first Spanish ToBI workshop (Mendoza-Denton, McGory, & Díaz-Campos 1999; Hualde 2000).

The gross shape of the intonation pattern of declaratives has been described similarly among these researchers. In a prototypical declarative produced without any particular lexical emphasis, there is a pitch accent on each content word, and every accent after the first is downstepped relative to the preceding accent peak. Also, there is a fall to a low pitch at the sentence boundary, after the last pitch accent. This gives an overall impression of a gradually declining backdrop pitch range, a series of smaller and smaller peaks ending with a final fall in pitch at the end of the utterance.

There is less agreement as to the analysis and number of pitch accent types, about the potential for some content words to be produced without pitch accents, and the number and types of boundary pitch movements. The potential inventory of pitch accents, their location within declaratives, and the inventory of boundary tones is the subject of the current investigation.

 Structure, Meaning, and Acquisition in Spanish, ed. James F. Lee et al., 73-92. Somerville, MA: Cascadilla Press.

Pitch accents are phonological categories that specify the fundamental frequency patterns associated with particular syllables. In Spanish, these associated syllables are stressed. Within an Autosegmental-Metrical (AM) analysis of intonation, pitch accent categories are assigned either a single H(high) or L(low) label or a combination of H and L labels. Falling pitch accents are represented as H+L, rising pitch accents as L+H, and level pitch accents as L or H. Important to these labels is the location of an asterisk that is assigned to either the L or H component of the pitch accent. This asterisk denotes the localization of the tone target that is consistently realized within the stressed syllable. For example, the H target in a L+H* is typically realized within the stressed syllable. In the case of the pitch accent L*+H, the L target is aligned with the stressed syllable. Pitch accent categories that potentially exist in some or all varieties of Spanish are rising pitch accents (L+H* and L*+H), level pitch accents (L* and H*), and falling pitch accents (H+L* and H*+L).

The last pitch accent in an utterance is the "nuclear pitch accent"; and those produced before the nuclear accent are then "prenuclear pitch accents". Earlier researchers of Spanish intonation have observed differences between these two positions in the timing of the accentual peak, with the peak typically being after the accented syllable in a prenuclear pitch accent and within the accented syllable of nuclear pitch accents (Navarro-Tomás 1948). Prenuclear and nuclear pitch accents have been classified as belonging to the same phonological category by Prieto and her colleagues (Prieto et al. 1996, Prieto 1998), Hualde (2000) and Nibert (1999). In this "one category" analysis, the observed differences in peak timing are different phonetic realizations of the same phonological pitch accent type. Prieto uses the label H* to refer to this pitch accent; Hualde and Nibert use the label (L+H)*. According to these accounts, the location of the pitch accent's peak is influenced by stress clash and tonal crowding. Consequently, pitch accent variants can be described as allotones of a single pitch accent.

Sosa (1999) and Face (2000) have posited that multiple pitch accents exist in Spanish, and this was the consensus also at the first Sp_ToBI workshop. According to Face (2000), two pitch accents are consistently used in declaratives: L*+H is consistently produced in prenuclear position while L+H* is produced in nuclear position. Sosa (1999), on the other hand, posits that there are more than two pitch accents, but he agrees that the inventory of prenuclear and nuclear types differ. These pitch accent types are illustrated in Figure 1.

	Prenuclear	Nuc
Sosa	H*+L,L*+H, L+H*	L+H H+H
Prieto and colleagues	H*	H*
Face	L*+H	L+H
Hualde, Nibert	(L+H)*	(L+H
Sp_ToBI participants	L*+H	L+H H+L

Figure 1. The number and type of pit and nuclear positions in declaratives Spanish intonation.

According to this "multiple categori content words does not affect the realiz in the realization of pitch accents are ac accent categories.

Because of the downstepping pa content word is often produced with syllable, or no visible rise at all. There been posited for the intonational status between a rise and no rise is not contra Spanish intonation that posit one pitc produced with a nuclear L+H* pitch according to Prieto et al. (1995) and I Nibert (2000) and Hualde (2000). Ano the realization of the "reduced" rise contrasting pitch accent types. Sosa ("reduced" nuclear pitch accents disting rise, calling the first a H* pitch accen also possible that content words need r and instead be deaccented. Participants rule out this possibility, and found dea earlier content word was produced with

Why might these different acco accounts take into consideration the a syllables yet one group of researchers p posits multiple pitch accents. One e Spanish intonation exist and this possi Spanish intonation have concentrated o Mexican Spanish (1995, 1996, 1998 (2000); ToBI Workshop members ob Spain; and Sosa observed multiple va Colombia, Puerto Rico, Venezuela, Sp pitch accents that we ask in this study

ories that specify the fundamental
cular syllables. In Spanish, these
an Autosegmental-Metrical (AM)
ories are assigned either a single
of H and L labels. Falling pitch
h accents as L+H, and level pitch
is the location of an asterisk that is
of the pitch accent. This asterisk
at is consistently realized within the
et in a L+H* is typically realized
e pitch accent L*+H, the L target is
nt categories that potentially exist in
tch accents (L+H* and L*+H), level
accents (H+L* and H*+L).
he "nuclear pitch accent"; and those
"prenuclear pitch accents". Earlier
rved differences between these two
, with the peak typically being after
h accent and within the accented
omás 1948). Prenuclear and nuclear
longing to the same phonological
to et al. 1996, Prieto 1998), Hualde
category" analysis, the observed
phonetic realizations of the same
the label H* to refer to this pitch
+H)*. According to these accounts,
nfluenced by stress clash and tonal
ts can be described as allotones of a

ted that multiple pitch accents exist
so at the first Sp_ToBI workshop.
accents are consistently used in
l in prenuclear position while L+H*
), on the other hand, posits that there
ees that the inventory of prenuclear
types are illustrated in Figure 1.

	Prenuclear	Nuclear	Analysis
Sosa	H*+L,L*+H, L+H*	L+H*,H+L*, H+H*,L*,H*	Multiple Pitch Accents
Prieto and colleagues	H*	H*	Single Pitch Accent
Face	L*+H	L+H*	Two Pitch Accents
Hualde, Nibert	(L+H)*	(L+H)*	Single Pitch Accent
Sp_ToBI participants	L*+H	L+H*, H*, H+L*	Multiple Pitch Accents

Figure 1. The number and type of pitch accents occurring in prenuclear and nuclear positions in declaratives according to different theories of Spanish intonation.

According to this "multiple categories" analysis, the segmental makeup of content words does not affect the realization of tone targets. Instead, differences in the realization of pitch accents are accounted for by there being different pitch accent categories.

Because of the downstepping pattern in Spanish declaratives, the final content word is often produced with a very reduced rise within the stressed syllable, or no visible rise at all. There are three possible explanations that have been posited for the intonational status of this final content word. The difference between a rise and no rise is not contrasted in Face's account and in accounts of Spanish intonation that posit one pitch accent type. The final content word is produced with a nuclear L+H* pitch accent according to Face (2000), a H* according to Prieto et al. (1995) and Prieto (1996), and a (L+H)* according to Nibert (2000) and Hualde (2000). Another possibility is that these differences in the realization of the "reduced" rise in the final content word are due to contrasting pitch accent types. Sosa (1999) posits that there are two types of "reduced" nuclear pitch accents distinguishing between a reduced F_0 rise and no rise, calling the first a H* pitch accent and the second a L* pitch accent. It is also possible that content words need not be produced with a pitch accent at all, and instead be deaccented. Participants in the Sp_ToBI workshop (1999) did not rule out this possibility, and found deaccenting particularly noticeable when an earlier content word was produced with focus.

Why might these different accounts of Spanish intonation exist? All accounts take into consideration the alignment of F_0 peaks relative to stressed syllables yet one group of researchers posits a single pitch accent, while another posits multiple pitch accents. One explanation is that different varieties of Spanish intonation exist and this possibility is great given that investigations of Spanish intonation have concentrated on a particular variety. Prieto has observed Mexican Spanish (1995, 1996, 1998); Face has observed Castilian Spanish (2000); ToBI Workshop members observed productions from Venezuela and Spain; and Sosa observed multiple varieties of Spanish in Argentina, Mexico, Colombia, Puerto Rico, Venezuela, Spain, and Cuba. The questions regarding pitch accents that we ask in this study are (1) How many pitch accent types are

there? (2) Are there separate inventories for prenuclear and nuclear position? And, (3) Can a content word be produced without an accent?

Navarro-Tomás (1948) describes the final pitch contours in declaratives in *Manual de Intonación Española* (*Manual of Spanish Intonation*). In this account he describes five different types of pitch movements called *tonemas* 'tonemes' all realized after the last stressed syllable at the right edge of the intonational phrase. Each toneme is associated with a different meaning. The first of these is a falling toneme produced with a steep falling pitch contour. In an emphatic discourse, the pitch fall is more dramatic. According to Navarro-Tomás, this fall indicates the end of a declarative sentence. The second is a rising toneme produced with a steep rising pitch contour. This rise indicates emphasis in the predicate between contrasting concepts. The third is a mid-falling toneme produced with a falling contour that is less dramatic or steep than the falling toneme. The mid-falling toneme indicates uncertainty in a declarative sentence. This contour expresses that the speaker produced a declarative statement with some hesitation. The fourth is a mid-rising toneme produced with a shallower rise than the rising toneme. Navarro-Tomás maintains that the mid-rising toneme indicates continuation and secondary contrasts between concepts. The fifth is a sustained toneme produced in the middle of a person's pitch range. This boundary tone indicates incomplete meaning and an abrupt end without finishing an idea. If we use autosegmental metrical labels to describe the boundary tones proposed by Navarro-Tomás, we can describe both the falling and mid-falling toneme as a low boundary tone, L%; the rising toneme as a high boundary tone, H%; the mid-rising toneme as a rising boundary tone, LH%; and a sustained toneme as a mid boundary tone, M%.

Utterances in more recent accounts of intonation are produced with a limited number of boundary tones. Although all of the pitch tracks that Prieto et al. and Face show have only L% boundary tones, and these authors do not mention rising or sustained tones in their materials, this may be because their materials were read lists of sentences. Our test materials are a connected string of sentences in a longer, coherent discourse, which may give more opportunity for the other boundary pitch movement types noted by Navarro-Tomás (1948). If we suggest here that different pitch accent inventories might exist in multiple varieties of Spanish, then it is possible that different inventories of boundary tones might also exist. Another possibility is that the recording conditions have influenced the use of particular boundary tone types. The utterances that have been observed have for the most part, been produced as single sentences with little or no contextual information. Because of the nature of these utterances, the relationship between phrases that Navarro-Tomás suggests indicating continuation of an idea or the contrast between multiple ideas are not likely to exist in the target sentences in more recent observations. Questions regarding edge tones that we ask in this study are: (1) What is the possible inventory of edge tones in multiple varieties of Spanish? (2) What is the relationship between boundary tone choice and communicative function?

2. Methods

Sixteen native Spanish speak
investigation. We obtained speech r
speaker for each of 8 different Spa
Rica, Chile, Mexico, Puerto Rico, Sp
took place in a sound-attenuated
Department of Linguistics at The Ohi
a paragraph about cultural and ling
world written by Patricia Lunn (Mic
most fluent of two repetitions.

To observe the potential relation
of a discourse segment and the choic
of discourse segments within the writ
each speaker's productions. To segm
segment (DS) units defined by Gros
with a complete communicative fu
further divided the text into support
phrases that were independent units
complete ideas, while those that co
ideas. This distinction allowed us t
"word juncture" indicated by spaces
idea labeled with a single slash "/", t
slashes "//", and the end of a comple
discourse analysis of the text is provi

s for prenuclear and nuclear position?
without an accent?
final pitch contours in declaratives in
of Spanish Intonation). In this account
movements called *tonemas* 'tonemes'
e at the right edge of the intonational
different meaning. The first of these is
falling pitch contour. In an emphatic
According to Navarro-Tomás, this fall
ence. The second is a rising toneme
ur. This rise indicates emphasis in the
. The third is a mid-falling toneme
less dramatic or steep than the falling
s uncertainty in a declarative sentence.
produced a declarative statement with
ng toneme produced with a shallower
Tomás maintains that the mid-rising
dary contrasts between concepts. The
the middle of a person's pitch range.
e meaning and an abrupt end without
ental metrical labels to describe the
más, we can describe both the falling
y tone, L%; the rising toneme as a high
ne as a rising boundary tone, LH%; and
e, M%.
s of intonation are produced with a
ugh all of the pitch tracks that Prieto et
dary tones, and these authors do not
r materials, this may be because their
ur test materials are a connected string
rse, which may give more opportunity
ypes noted by Navarro-Tomás (1948).
cent inventories might exist in multiple
that different inventories of boundary
y is that the recording conditions have
y tone types. The utterances that have
een produced as single sentences with
se of the nature of these utterances, the
Navarro-Tomás suggests indicating
etween multiple ideas are not likely to
cent observations. Questions regarding
(1) What is the possible inventory of
anish? (2) What is the relationship
unicative function?

2. Methods

Sixteen native Spanish speakers provided the data for the present investigation. We obtained speech recordings from one male and one female speaker for each of 8 different Spanish dialects: Argentina, Colombia, Costa Rica, Chile, Mexico, Puerto Rico, Spain and Venezuela. The recording sessions took place in a sound-attenuated booth located in Cunz Hall within the Department of Linguistics at The Ohio State University. The 16 consultants read a paragraph about cultural and linguistic variability in the Spanish-speaking world written by Patricia Lunn (Michigan State University). We analyzed the most fluent of two repetitions.

To observe the potential relationship between the communicative function of a discourse segment and the choice of boundary tone, we identified the edges of discourse segments within the written text and the prosodic phrase edges from each speaker's productions. To segment the text, we determined the discourse segment (DS) units defined by Grosz and Sidner (1986) as a segment of text with a complete communicative function or purpose. Within each DS, we further divided the text into supporting information of two types. Supporting phrases that were independent units and could be stated alone were considered complete ideas, while those that could not be stated alone were incomplete ideas. This distinction allowed us to label four types of discourse junctures: "word juncture" indicated by spaces between words, the end of an incomplete idea labeled with a single slash "/", the end of a complete idea labeled with two slashes "//", and the end of a complete DS labeled with three slashes "///". This discourse analysis of the text is provided in Figure 2.

Overall Purpose: Discuss similarities & differences among Spanish speaking people

DS1: Describe the population and residence of Spanish speakers
Hay más de trescientos millones de personas / que hablan español// principalmente / en España y Latinoamérica///.
[There are more than three hundred million people / who speak Spanish // primarily / in Spain and in Latin America///.]

DS2: State that different varieties of Spanish exist
Por razones históricas y geográficas / han divergido los varios dialectos de la lengua //.
No sólo existen diferentes acentos / sino también diferentes léxicos //.
[For historical and geographical reasons / there are various dialects of the language //.]
[Not only do different accents exist / but there also different words //.]
Se dice coche / piso y maíz en España //, auto / apartamento, y choclo en Chile //, carro / departamento y elote en México. ///
[People say coche / piso and maíz in Spain //, auto / apartamento and choclo in Chile //, carro / departamento and elote in México. ///]

DS3: Describe the cultural similarities among Spanish-speaking countries
Sin embargo / las manifestaciones culturales del mundo hispanohablante.../
[Nonetheless /, cultural manifestations of the Spanish speaking world.../]
arte / cine / deporte / literatura / música y televisión/
[art / theater / deporte / literature / music and television/]
sirven para compensar la diversidad lingüística///.
[serve to compensate for the linguistic diversity///.]

Figure 2. Discourse segmentation of the written text

After completing a discourse analysis of the text, we identified the location and type of each intonational phrase boundary by digitizing the speech and extracting the fundamental frequency contour using the Entropics, Inc., xwaves signal analysis software. A native Spanish speaker (the second author) listened to each recording and identified the location of a prosodic boundary. Next, we examined pitch tracks in order to classify the type of boundary tone. We labeled the type of tonal movement occurring at the right edge of these phrases using the following criteria:

H%: a rising pitch pattern rising high within the speaker's pitch range; higher than the peak of a rising pitch accent
M%: a sustained or slightly falling F_0 pattern in the unstressed syllable(s) after a final pitch accent; or a low rising pitch pattern (no higher than that of a rising pitch accent) within the utterance final stressed syllable

L%: a steep fall in F_0 after the last pitch acc
LH%: a fall in F_0 after the final stressed s
middle of the speaker's pitch range

Example utterances with these edge ton
5. The speaker in Figure 3 produced the u
right edge of *personas* and at the right edg
the stressed syllables of these words, and t
range at the end of each word. The utt
production of a LH% edge tone realized aft
after the stressed syllable followed by a sligh
pitch range. There is no stressed syllable at
of voicing between *sin embargo* and *las* is
This is a clear example of a LH%. The final
It was difficult to distinguish between M
utterance final syllable was stressed because
realized within the same syllable. A M% tar
manifestaciones because there is one poststr
production, there is little to no rise in the
labeled this as a M% edge tone. Figure
realization of a M% and H% providing a cle
to rise higher into a speaker's pitch range w
in the last syllable in *España*, as opposed to
F_0 in the last syllable of *principalmente* proc
penultimate stress, yet the F_0 patterns are qui

We predicted that the choice of edge t
location of the intonational phrase within t
the discourse segmentation, that boundary
different general functions: finality at the en
continuation between complete ideas, and
ideas and words.

& differences among Spanish speaking

idence of Spanish speakers
ersonas / que hablan español//
mérica///.
illion people / who speak Spanish //
rica///.]
Spanish exist
/ han divergido los varios dialectos

no también diferentes

ns / there are various dialects of the

but there also different

a //, auto / apartamento, y choclo en
en México. ///
Spain //, auto / apartamento and choclo
lote in México. ///]
s among Spanish-speaking countries
lturales del mundo hispanohablante.../
s of the Spanish speaking world.../]
ica y televisión/
sic and television/]
lingüística///.
c diversity///.]

the written text

lysis of the text, we identified the location
boundary by digitizing the speech and
contour using the Entropics, Inc., xwaves
nish speaker (the second author) listened
ocation of a prosodic boundary. Next, we
ify the type of boundary tone. We labeled
at the right edge of these phrases using the

h within the speaker's pitch range; higher

pattern in the unstressed syllable(s) after a
ch pattern (no higher than that of a rising
stressed syllable

L%: a steep fall in F_0 after the last pitch accent
LH%: a fall in F_0 after the final stressed syllable followed by a short rise to middle of the speaker's pitch range

Example utterances with these edge tones are provided in Figures 3, 4, and 5. The speaker in Figure 3 produced the utterance with two L% tones, at the right edge of *personas* and at the right edge of *español*. The pitch rises within the stressed syllables of these words, and then falls within the speaker's pitch range at the end of each word. The utterance in Figure 4 illustrates the production of a LH% edge tone realized after the word *embargo*. There is a fall after the stressed syllable followed by a slight rise to the middle of the speaker's pitch range. There is no stressed syllable at the edge of this word, and cessation of voicing between *sin embargo* and *las* is evidence for a boundary juncture. This is a clear example of a LH%. The final edge tone in this example is a M%. It was difficult to distinguish between M% and H% edge tones when the utterance final syllable was stressed because the pitch accent and edge tone are realized within the same syllable. A M% target is more clearly seen in the word *manifestaciones* because there is one poststressed syllable in this word. In this production, there is little to no rise in the unstressed syllable [nes] and so we labeled this as a M% edge tone. Figure 5 illustrates the difference in the realization of a M% and H% providing a clear example of how the F_0 continues to rise higher into a speaker's pitch range when producing a H% as can be seen in the last syllable in *España*, as opposed to the leveling or slight falling off of F_0 in the last syllable of *principalmente* produced with a M%. Both words have penultimate stress, yet the F_0 patterns are quite different.

We predicted that the choice of edge tones would differ depending on the location of the intonational phrase within the discourse. We assume, based on the discourse segmentation, that boundary tones will be used to indicate three different general functions: finality at the end of discourse segments, finality or continuation between complete ideas, and continuation between incomplete ideas and words.

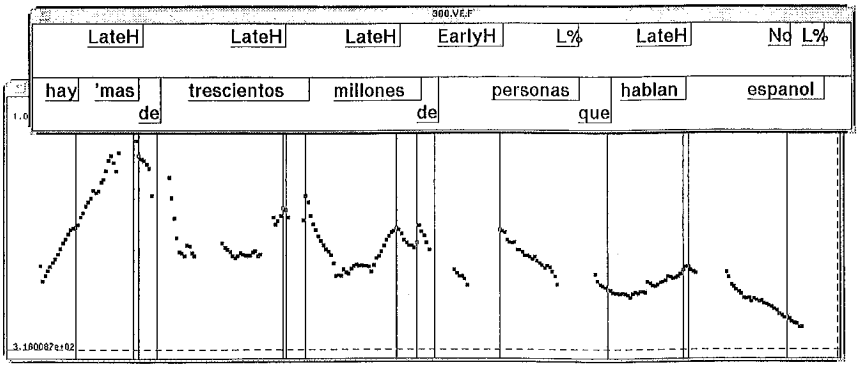


Figure 3. Illustration of L% boundary tones and pitch accents realized with LateH, EarlyH, and NO pitch change in the utterance *Hay más de trescientos millones de personas que hablan español.*

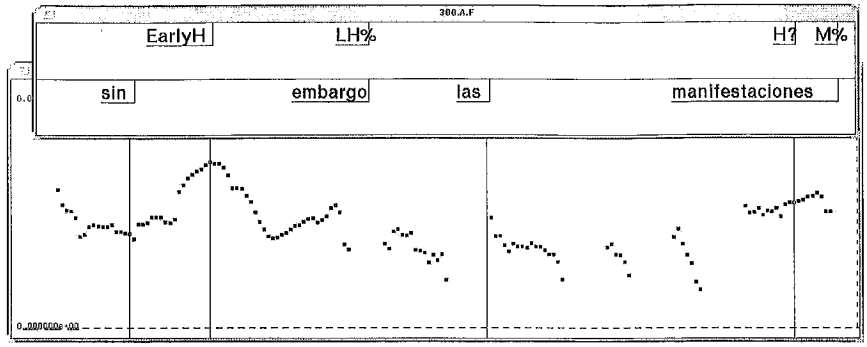


Figure 4. Illustration of a LH% boundary tone in the phrase *sin embargo las manifestaciones.*

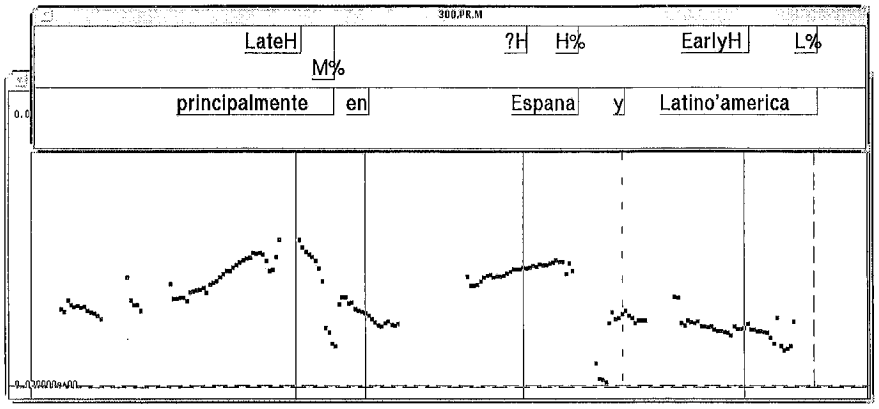


Figure 5. Illustration of M% and H% boundary tones in the phrase *principalmente en España y Latinoamérica.*

In order to isolate the location of
final content words in utterances that e
to separate a H tone associated with a
a boundary tone in utterances ending
Figure 5. The location of a H pitch a
from the H target of the H% boundary
alignment of L and H tones relative to
using the following labels and criteria:

Early H: F_0 peak is realized inside the
Late H: F_0 peak is realized after the en
Falling HL: F_0 fall within the stressed
and ending at offset
NO: No visual L or H target near or wi
between surrounding tone targets

We used the waveform envelope
syllable edges. Early H alignment is ill
F_0 peak is produced within the stres
alignment is illustrated in Figure 3. E
utterance *Hay más de trescientos mil*
accent whose peak is not realized until
más is realized within the word *de* and
realized in a syllable after the accent
Figure 6 below.

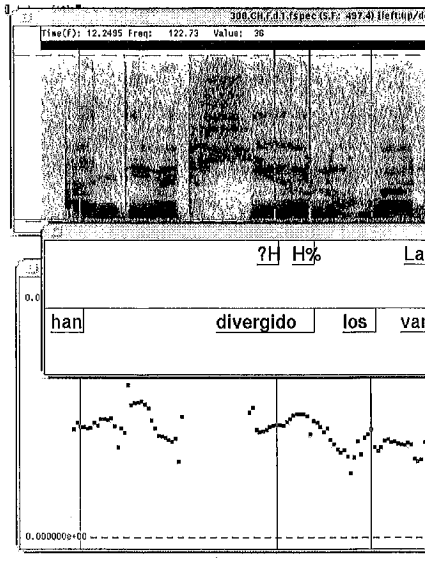
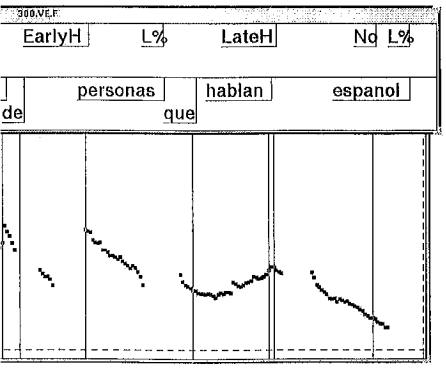
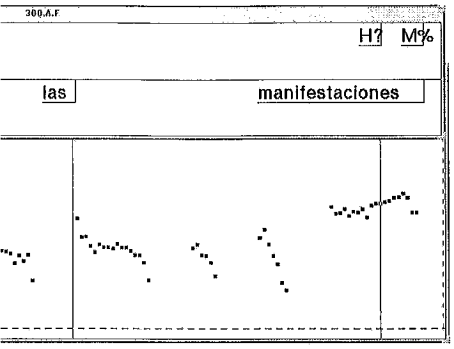


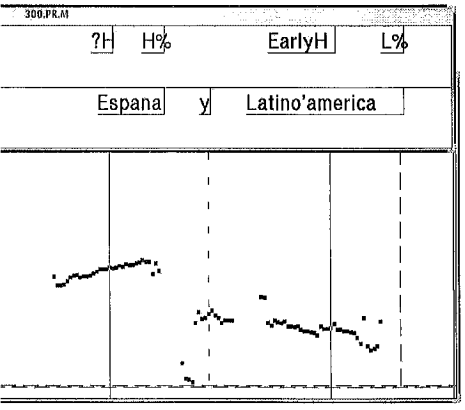
Figure 6. Illustration of a falling HL



y tones and pitch accents realized with e in the utterance *Hay más de ablan español.*



ıdary tone in the phrase *sin embargo*



% boundary tones in the phrase *érica.*

In order to isolate the location of pitch accent targets, we analyzed the two final content words in utterances that ended with a pitch fall (L%). It is difficult to separate a H tone associated with a pitch accent from the tone associated with a boundary tone in utterances ending with H% or M%. This is illustrated in Figure 5. The location of a H pitch accent target in *España* is not discernable from the H target of the H% boundary tone. Pitch pattern descriptions based on alignment of L and H tones relative to the end of the stressed syllable were made using the following labels and criteria:

Early H: F_0 peak is realized inside the stressed syllable
Late H: F_0 peak is realized after the end of the stressed syllable
Falling HL: F_0 fall within the stressed syllable starting at stressed syllable onset and ending at offset
NO: No visual L or H target near or within the stressed syllable; F_0 interpolates between surrounding tone targets

We used the waveform envelope and spectrograms to isolate the stressed syllable edges. Early H alignment is illustrated in Figure 4. In this utterance, the F_0 peak is produced within the stressed syllable [bár] in *embargo*. Late H alignment is illustrated in Figure 3. Each content word at the beginning of the utterance *Hay más de trescientos millones...* is produced with a rising pitch accent whose peak is not realized until after the stressed syllable. The F_0 peak in *más* is realized within the word *de* and illustrates how pitch accent peaks can be realized in a syllable after the accented word. HL alignment is illustrated in Figure 6 below.

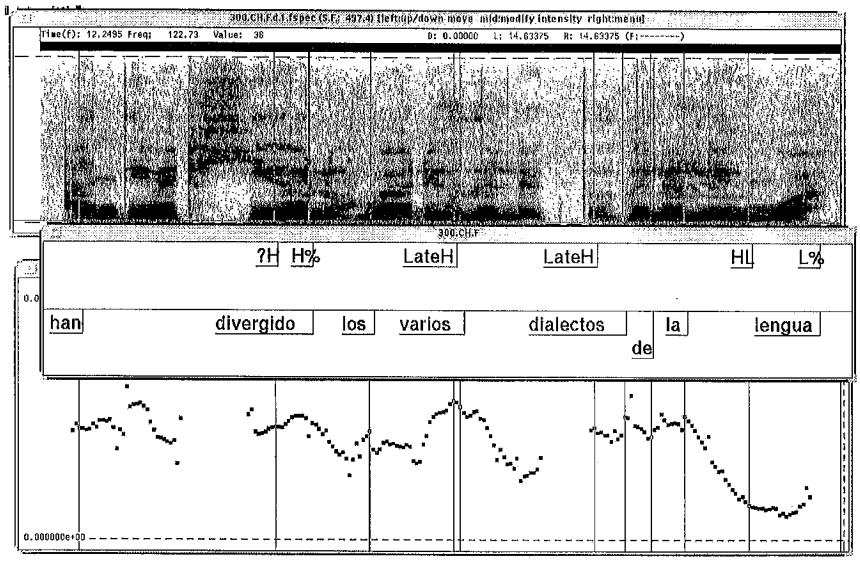


Figure 6. Illustration of a falling HL pitch accent pattern.

The last two content words in the utterance in Figure 6 are *dialectos* and *lengua*. The stressed syllables in these words are separated by 3 unstressed syllables, however the pitch does not sag between the F_0 peak in the third syllable of *dialectos* and the first stressed syllable in *lengua*. We labeled the pitch accent in the nuclear accent as having a falling HL pitch pattern. Finally, we used the label NO when there were no visible F_0 targets within the content word. In these cases, the F_0 pattern within the word was an interpolation between surrounding tone events, as illustrated in Figure 3. The final word in this utterance is *español*. The final syllable is stressed, yet there is no visual low or high tone target produced anywhere near the word final stressed syllable. Instead, F_0 interpolates between the H pitch accent target in *hablan* to the L boundary tone target at the end of the utterance.

3. Results: Pitch Accents

3.1. Pitch accents across all speakers

We looked at pitch contours over the last two content words in each intonational phrase. There were twelve distinct patterns observed with varying frequency. We limit our discussion to the combinations of pitch accent types produced in prenuclear and nuclear contexts that were used more than once by at least three dialect groups. These five pitch patterns and the total number of times they were used are listed in Figure 7. We have provided autosegmental metrical labels in parentheses as a description of the potential pitch accent types these patterns represent.

The most commonly used pattern is a pitch rise within the stressed syllables of the final two content words. The first accent is realized with late H peak, and the second with an early H peak. This pattern is what has been described as a prenuclear L*+H followed by a nuclear L+H* in a multiple accent analysis (Face 2000; ToBI Workshop 1999). We found these individual pitch accent patterns to occur in other combinations as well. Late peak alignment in the prefinal content word occurs in three of the five pattern types discussed here accounting for 69% of the data. The tendency for pitch accents in prefinal content words to be produced with late peak realization in our data set is consistent with findings by Prieto et al. (1996), Prieto (1998), Sosa (1999), the Sp_ToBI group (1999) and Face (2000). Late peak alignment was less frequent in the final content word, accounting for only 3% of productions. Early peak alignment was most typical in the final content word occurring in two of the five pattern types discussed here accounting for 45% of the data. It occurred less frequently in prenuclear position, accounting for 16% of the data.

Another pitch accent pattern that was produced frequently was a falling HL pattern in the nuclear accented word. Although HL was not used consistently in other combinations, it nonetheless accounted for 21% of these most commonly produced patterns. We were quite interested in this pattern because Sosa's analysis (1999) is the only one that posits the existence of this pitch accent pattern.

We were unable to identify any p
many productions. The second author,
no sense of prominence on this final c
accent occurred after a LateH pitch
Spanish intonation have described the
accent, we found that no visible tone
commonly used pitch patterns.

Pitch Pattern	AM description
LateH Early H	(L*+H L+H*)
LateH N0	(L*+H NO)
LateH FallingHL	(L*+H H+L*)
EarlyH EarlyH	(L+H* L+H*)
EarlyH LateH	(L+H* L*+H)
Other	
Total Utterances	

Figure 7. Pitch patterns types and the subjects.

Two follow-up analyses were com
of segmental affects on the realization
rising accents in order to determine if L
tonal crowding, as claimed by Prieto e
instead distinct pitch accent types, as cl
analysis was completed to observe the
realization of the falling HL pitch patte

To observe the possible effects
prenuclear rising accents, we observed
Late H accent patterns followed by
varying numbers of unstressed syllable
The distribution of early and late pe
unaffected by stress clash. Both early
prenuclear accent when there are on
stressed syllables. Contrary to predicti
occurs when there is only a single int
and early peak alignment occurs when
25% of occurrences). With this eviden
separate pitch accent categories.

Unstressed Syllables	One	Two
Late H	4	10
Early H	1	5

Figure 8. The distribution of late and accents with 1-5 intermittent unstress

We were unable to identify any pitch target in the final content word in many productions. The second author, a native Spanish speaker, also perceived no sense of prominence on this final content word. The nonexistence of a pitch accent occurred after a LateH pitch accent. Although no other accounts of Spanish intonation have described the final content word as having no pitch accent, we found that no visible tone target was realized in 16% of the most commonly used pitch patterns.

Pitch Pattern	AM description	Times used	% of use
LateH Early H	(L*+H L+H*)	30	32
LateH N0	(L*+H NO)	15	16
LateH FallingHL	(L*+H H+L*)	20	21
EarlyH EarlyH	(L+H* L+H*)	12	13
EarlyH LateH	(L+H* L*+H)	3	3
Other		14	15
Total Utterances		94	100

Figure 7. Pitch patterns types and the number of times used across all subjects.

Two follow-up analyses were completed to observe the potential influence of segmental affects on the realization of the F_0 peak in prenuclear and nuclear rising accents in order to determine if Late H and Early H patterns resulted from tonal crowding, as claimed by Prieto et al. (1995) and Hualde (2000), or were instead distinct pitch accent types, as claimed by Face (2000). A third follow-up analysis was completed to observe the potential influence of stress clash on the realization of the falling HL pitch pattern.

To observe the possible effects of stress clash on peak location in prenuclear rising accents, we observed the frequency of prenuclear Early H and Late H accent patterns followed by a nuclear Late H accents separated by varying numbers of unstressed syllables. These results are provided in Figure 8. The distribution of early and late peak alignment in prenuclear accents is unaffected by stress clash. Both early and late peak alignment occur in the prenuclear accent when there are one to five unstressed syllables between stressed syllables. Contrary to predictions of stress clash, late peak alignment occurs when there is only a single intermittent syllable (13% of occurrences), and early peak alignment occurs when there are five intermittent syllables (in 25% of occurrences). With this evidence, we suggest that L+H* and L*+H are separate pitch accent categories.

Unstressed Syllables	One	Two	Three	Four	Five	Total
Late H	4	10	10	4	2	30
Early H	1	5	2	1	3	12

Figure 8. The distribution of late and early peaks in prenuclear rising accents with 1-5 intermittent unstressed syllables.

Second, we considered the possibility that the proximity of the L% boundary tone influenced the location of the peak of the nuclear pitch accent. We observed the distribution of nuclear pitch accents with early peaks and late peaks. Consistent with the stress patterns in Spanish, all utterances in our data set ended with a content word having zero to two poststressed syllables. The number of times a rising pitch accent was produced with early and late accentual peaks in words across these different stress positions is provided in Figure 9. Results indicate that the distribution of early peaks was similar across all stress types. In fact, early peaks were realized most often in words ending in one and two unstressed syllables where there was sufficient room for the peak to be realized later in the post stressed syllable. These results provide additional evidence that L+H* and L*+H are separate pitch accents, and the low occurrence of L*+H in nuclear position also suggests that L+H* is the preferred nuclear pitch accent.

Proximity of L% boundary	**Early H peak (L+H*)**	**Late H peak (L*+H)**
0 syllable	13	0
1syllable	18	1
2 syllables	17	2

Figure 9. The distribution of pitch accents with early and late peak alignment across all utterance produced with a final L% tone.

The third question we asked was if the production of a falling HL pitch pattern was influenced by the proximity of the prefinal and final stressed syllables. We believe that this pattern is a H+L* (see Figure 5). The two final content words are produced in the phrase *dialectos de la lengua* in this utterance. A rising pitch accent is evident in the first word *dialectos*. A Late H target is realized in the poststressed syllable [tos]. The F_0 remains high through to the beginning of the stressed syllable [léŋ] in *lengua*. At this point a steep fall begins that continues through to the end of the stressed syllable. We posit that this fall in pitch is due to a H+L* pitch accent. This fall is contrasted to the steep fall in the word *personas* illustrated in Figure 3. The phrase final pitch fall in *personas* continues from the stressed penultimate syllable to the end of the word. We posit that the L% boundary tone is realized at the edge of the word. The pitch fall in the word *lengua* (Figure 5) tapers off at the end of the stressed syllable and remains level until the end of the word. The fall within this stressed syllable is characteristic of a falling H+L pitch accent where the low target is realized near the end of the stressed syllable.

The distribution of nuclear HL is presented in Figure 10. If H+L* were a phonetic variation of a rising L+H pitch accent, we would expect to see the initial L target of a nuclear L+H pitch accent reappear when stressed syllables between the nuclear and prenuclear words were separated by more and more unstressed syllables. In other word
decrease as unstressed syllables in
between nuclear and prenuclear pit
falling pitch patterns. A falling pitc
one and five unstressed intermitten
were two intervening syllables. Th
pitch accent.

These three separate observati
tone crowding lead us to hypothes
accents in Spanish. These are L+
results for individual dialects, we
category status of pitch accents in S

No. of intermediate syllables
Zero
One
Two
Three
Four
Five

**Figure 10. The distribution of nu
degrees of stress clash**

3.2. Pitch accents within each dia

Distributions of final and pre
dialect are provided in Figure 11 a
most often for each dialect is in bo
content word (labeled "NO") in
produced most frequently in Pue
Spanish. In these utterances, the pr
A L+H* pitch accent is the most c
all dialect groups except Chile (see
used different labels to describe t
with the pitch accent patterns in
varieties of Spanish, Prieto's an
workshop's analysis of Peninsular
nuclear accent in Chilean speake
different from all other varieties.
type in the prefinal content word
language groups except Castilian s
this study, we expected that Castili

lity that the proximity of the L% the peak of the nuclear pitch accent. itch accents with early peaks and late in Spanish, all utterances in our data ro to two poststressed syllables. The produced with early and late accentual ss positions is provided in Figure 9. rly peaks was similar across all stress ost often in words ending in one and s sufficient room for the peak to be le. These results provide additional parate pitch accents, and the low so suggests that L+H* is the preferred

H*)	Late H peak (L*+H)
	0
	1
	2

ts with early and late peak with a final L% tone.

the production of a falling HL pitch y of the prefinal and final stressed a H+L* (see Figure 5). The two final *dialectos de la lengua* in this utterance. st word *dialectos*. A Late H target is . The F_0 remains high through to the in *lengua*. At this point a steep fall of the stressed syllable. We posit that ent. This fall is contrasted to the steep igure 3. The phrase final pitch fall in nultimate syllable to the end of the ne is realized at the edge of the word. 5) tapers off at the end of the stressed the word. The fall within this stressed pitch accent where the low target is le.

esented in Figure 10. If H+L* were a accent, we would expect to see the cent reappear when stressed syllables ds were separated by more and more unstressed syllables. In other words, the frequency of HL pitch patterns would decrease as unstressed syllables increased. The number of unstressed syllables between nuclear and prenuclear pitch accents did not influence the frequency of falling pitch patterns. A falling pitch pattern occurred when there were between one and five unstressed intermittent syllables, and was most common when there were two intervening syllables. This evidence suggests that H+L* is a separate pitch accent.

These three separate observations of the potential effects of stress clash and tone crowding lead us to hypothesize that there are at least three separate pitch accents in Spanish. These are L+H*, L*+H, and H+L*. In our discussion of results for individual dialects, we will use these labels to indicate the multiple category status of pitch accents in Spanish.

No. of intermediate syllables	Times an HL pattern occurred
Zero	0
One	5
Two	10
Three	6
Four	0
Five	1

Figure 10. The distribution of nuclear falling pitch patterns with varying degrees of stress clash

3.2. Pitch accents within each dialect

Distributions of final and prefinal pitch accents in the utterances of each dialect are provided in Figure 11 and 12, respectively. The accent type produced most often for each dialect is in boldface. Tone targets did not exist in the final content word (labeled "NO") in some productions for all dialect groups, produced most frequently in Puerto Rican Spanish, and never in Mexican Spanish. In these utterances, the prefinal word receives the nuclear pitch accent. A L+H* pitch accent is the most common nuclear accent type in productions by all dialect groups except Chile (see Figure 11). Although previous analysis have used different labels to describe this pitch accent, these results are consistent with the pitch accent patterns in Face's and Hualde's analysis of Peninsular varieties of Spanish, Prieto's analyis of Mexican Spanish, and the ToBI workshop's analysis of Peninsular and Venezuelan Spanish. The most common nuclear accent in Chilean speakers was H+L*, which makes Chilean quite different from all other varieties. The most frequently occurring pitch accent type in the prefinal content word (see Figure 12) was L*+H, produced by all language groups except Castilian speakers from Spain. Of all dialect groups in this study, we expected that Castilian speakers would be most likely to use pitch

Final content word	L+H*	L*+H	NO	H+L*
Chile	3		1	**9**
Colombia	**6**		2	
Costa Rica	**2**	1	**2**	
Mexico	**5**	3		2
Puerto Rico	4	1	**6**	2
Spain	**7**	1	2	1
Argentina	**8**	1	1	5
Venezuela	**11**		4	4
Total=94	**46**	7	18	23

Figure 11: The distribution of pitch accent types in utterance final content words produce by speakers of 8 varieties of Spanish

PreFinal Content Word	L*+H	L+H*	NO	H+L*
Chile	**13**			
Colombia	**8**			
Costa Rica	**2**	2	1	
Mexico	**6**	4		
Puerto Rico	**11**	2		
Spain	1	**7**	3	
Argentina	**9**	3	1	2
Venezuela	**18**	1		
Total=94	**68**	19	4	2

Figure 12: The distribution of pitch accent types in penultimate content words produced by speakers of 8 varieties of Spanish

accents with late peak alignment. This result would have been consistent with Castilian productions observed by Face (2000) and the Sp_ToBI workshop members (1999). However, there was only one rising pitch accent with late peak alignment, and seven with early peak alignment for these speakers. Late peak alignment was characteristic of most productions in the remaining language groups. Chilean, Colombian, Venezuelan and Puerto Rican speakers almost exclusively produced L*+H pitch accents in this prenuclear context. These results concur with the results of the Sp_ToBI group for Venezuelan speakers. Sosa (1999) also posited the existence of this accent type in productions by the

multi dialects he observed. Specificall
prenuclear position in the varieties o
Puerto Rico, Venezuela, Cuba, and No

We identified 9 different combina
We will direct the discussion to the f
patterns, or tunes, and the number o
group are provided in Figure 13. Th
L+H*, was used by all dialect groups
used by Colombian and Venezuelan sp
observations of Venezuelan Spanish
Although Peninsular speakers produce
they did not use these two pitch acce
speakers more typically used a series
L*+H followed by a H+L* nuclear acc
by Chilean speakers and was one o
Argentine speakers.

Final	L*+H L+H*	L*+H H+L*	
Chile	3	9	
Colombia	6		
Costa Rica	1		
Mexico	2	1	
Puerto Rico	4	2	
Spain			
Argentina	4	4	
Venezuela	10	4	
Total=94	30	20	

Figure 13. The distribution of uttera

Similar among all dialect groups
accent and a L*+H as a prenuclear ac
nuclear accent. The lack of pitch acce
content word. The combinations that s
of homogeneity may be because diffe
common in particular dialects, or th
particular combination over another.
not consistent in their placement of
results indicate that L+H* located in
accent in certain dialects of Spanish.
L*+H as a prenuclear accent in Penins

L*+H	NO	H+L*
	1	**9**
	2	
1	**2**	
3		2
1	**6**	2
1	2	1
1	1	5
	4	4
7	18	23

ccent types in utterance final content ies of Spanish

L+H*	NO	H+L*
2	1	
4		
2		
7	3	
3	1	2
1		
19	4	2

accent types in penultimate content ties of Spanish

result would have been consistent with e (2000) and the Sp_ToBI workshop ly one rising pitch accent with late peak lignment for these speakers. Late peak productions in the remaining language an and Puerto Rican speakers almost ents in this prenuclear context. These _ToBI group for Venezuelan speakers. f this accent type in productions by the

multi dialects he observed. Specifically, Sosa points out the used of L*+H in prenuclear position in the varieties of Spanish spoken in Colombia, Mexico, Puerto Rico, Venezuela, Cuba, and Northern and Southern dialects of Spain.

We identified 9 different combinations of pitch accent types in this dataset. We will direct the discussion to the five most frequently used patterns. These patterns, or tunes, and the number of productions produced by each dialect group are provided in Figure 13. The most commonly used pattern, L*+H L+H*, was used by all dialect groups except Castilian and was most frequently used by Colombian and Venezuelan speakers. These results are consistent with observations of Venezuelan Spanish made by the ToBI workshop group. Although Peninsular speakers produced a prenuclear L*+H and a nuclear L+H*, they did not use these two pitch accents together in the same tune. Peninsular speakers more typically used a series of two L+H* pitch accents. A prenuclear L*+H followed by a H+L* nuclear accent was the most common tune produced by Chilean speakers and was one of two most frequent tunes produced by Argentine speakers.

Final	**L*+H L+H***	**L*+H H+L***	**L+H* L+H***	**L*+H NO**	**L+H* L*+H**
Chile	3	9		1	
Colombia	6			2	
Costa Rica	1		1	1	1
Mexico	2	1	3		
Puerto Rico	4	2		5	1
Spain			4	1	1
Argentina	4	4	3	1	
Venezuela	10	4	1	4	
Total=94	30	20	12	15	3

Figure 13. The distribution of utterance final tunes in 8 dialects of Spanish.

Similar among all dialect groups is the frequent use of L+H* as a nuclear accent and a L*+H as a prenuclear accent. Also, if H+L* occurred, it was as a nuclear accent. The lack of pitch accent also was far more common in the final content word. The combinations that speakers use are less consistent. This lack of homogeneity may be because different pitch accent combinations are more common in particular dialects, or that these particular speakers preferred a particular combination over another. Another possibility is that speakers were not consistent in their placement of focus. Face (2000) and ToBI Workshop results indicate that L+H* located in prenuclear position is used to mark focal accent in certain dialects of Spanish. This may account for the nonexistence of L*+H as a prenuclear accent in Peninsular productions. If these speakers placed

the prefinal word in focus, then they might produce a L+H* instead of a L*+H pitch accent. Further investigations need to be completed in order to observe the likelihood of a particular pitch accent used for different types of focus in multiple varieties of Spanish.

4. Boundary tones

4.1. All speakers

The distribution of four boundary tones occurring at four juncture types is provided in Figure 14. The most frequently occurring boundary tone was L%, produced in 43% of the utterances. This edge tone was produced at all four types of junctures, but was overwhelmingly preferred over the other edge tones at the end of complete ideas--accounting for 98% of boundary tones at this type of juncture--and discourse segment edges--accounting for 90% of boundary tones at this juncture type. The high frequency of L% use in these two contexts suggests that the L% boundary indicates finality and completeness of information. L% boundaries were used less often between words and incomplete ideas accounting for 21% and 32% of boundary tone types used at these junctures respectively. We posit that the boundary used at word junctures indicates continuation of information, or that an idea is not yet complete.

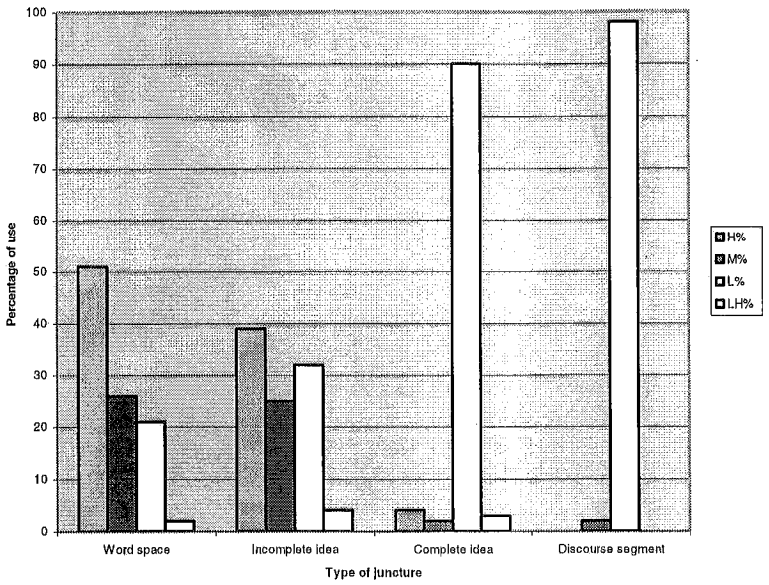


Figure 14. The distribution of edge tone types at 4 types of text junctures.

A rising edge tone, H%, was th
word junctures (51%) and incomplet
occur at the end of a discourse se
boundary tones at a complete idea e
information within a phrase is inc
analysis (1948) suggesting that this
meaning in cases where the listen
utterance.

An M% boundary tone was us
occurred with less frequency and s
indicating incompleteness as does t
least often in this dataset. They occu
and complete ideas accounting for
junctures, respectively, and never we
We cannot posit what this edge tone
its similar distribution across three ju

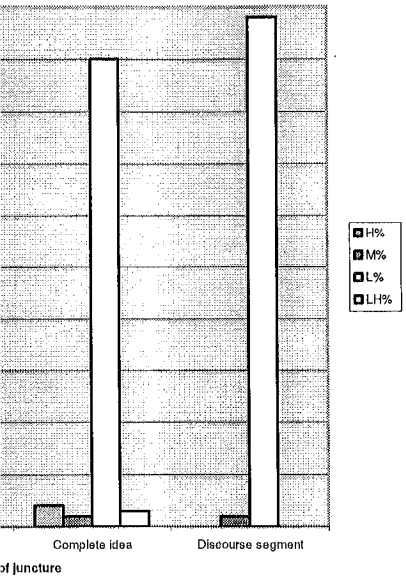
Together, these results indicate
information is most likely to be ind
whereas finality is most likely to be
results are in part supportive of N
Tomás suggests that a falling tonen
finality, we find that it may also be u
He also suggests that a sustained to
toneme (H% in our analysis) are used
suggest that a mid-rising tone (LH%
function. Finally, while Navarro-Ton
suggests it is indicates uncertainty. W
also indicate continuation between inf

4.2. Edge tones across dialects

The frequency and type of edge
provided in Figure 15. Three boun
occurred in at least some of the produ
boundary tone was produced with th
phrases--in 6 of the Spanish varietie
Mexico, Puerto Rico, and Venezu
productions by these 6 language grou
reverse was true for speakers from C
about half of their phrases, and L%
The M% boundary tone occurred
speakers from Argentina, Colombia, S
and was produced least often by spea
frequency of these three boundary ty

ght produce a L+H* instead of a L*+H
to be completed in order to observe the
used for different types of focus in

nes occurring at four juncture types is
ntly occurring boundary tone was L%,
dge tone was produced at all four types
eferred over the other edge tones at the
8% of boundary tones at this type of
accounting for 90% of boundary tones
cy of L% use in these two contexts
cates finality and completeness of
ss often between words and incomplete
f boundary tone types used at these
he boundary used at word junctures
hat an idea is not yet complete.



edge tone types at 4 types of text

A rising edge tone, H%, was the most frequently occurring edge tone at word junctures (51%) and incomplete ideas (39%). This boundary tone did not occur at the end of a discourse segment, and represented only 4% of the boundary tones at a complete idea edge. We posit that H% indicates that the information within a phrase is incomplete. This supports Navarro-Tomás' analysis (1948) suggesting that this boundary is associated with incomplete meaning in cases where the listener is expecting the speaker to finish an utterance.

An M% boundary tone was used at the same junctures as the H%, but occurred with less frequency and so we suggest that it has the function of indicating incompleteness as does the H%. LH% boundaries were produced least often in this dataset. They occurred at word boundaries, incomplete ideas, and complete ideas accounting for 2%, 4%, and 3% of edge tones at these junctures, respectively, and never were produced at the discourse segment edge. We cannot posit what this edge tone might indicate given its infrequent use and its similar distribution across three juncture types.

Together, these results indicate that incompleteness or continuation of information is most likely to be indicated with H%, L% and M% edge tones whereas finality is most likely to be expressed with a L% boundary tone. These results are in part supportive of Navarro-Tomás's analysis. While Navarro-Tomás suggests that a falling toneme (L% in our analysis) is used for only finality, we find that it may also be used to convey other types of relationships. He also suggests that a sustained toneme (M% in our analysis) and a rising toneme (H% in our analysis) are used for continuation. Our data concur but also suggest that a mid-rising tone (LH% in our analysis) may also have a similar function. Finally, while Navarro-Tomás posits that a mid rising tones exists, he suggests it is indicates uncertainty. We suggest that a LH% boundary tone may also indicate continuation between information.

4.2. Edge tones across dialects

The frequency and type of edge tones produced by the 8 dialect groups are provided in Figure 15. Three boundary types including L%, H%, and M% occurred in at least some of the productions by all Spanish dialect groups. A L% boundary tone was produced with the highest frequency--in roughly half of the phrases--in 6 of the Spanish varieties including Argentina, Costa Rica, Spain, Mexico, Puerto Rico, and Venezuela. A H% also occurred frequently in productions by these 6 language groups--in roughly a fourth of the phrases. The reverse was true for speakers from Chile and Colombia. The H% was used in about half of their phrases, and L% occurred in about a fourth of the phrases. The M% boundary tone occurred in about a fourth of the productions by speakers from Argentina, Colombia, Spain, Mexico, Puerto Rico, and Venezuela and was produced least often by speakers from Chile and Costa Rica. From the frequency of these three boundary types in productions by the Spanish dialects

we observed, we can posit that the inventory of boundary types in these 8 dialects include a L%, H%, and M%.

What is most interesting from these results is the existence of the LH% boundary tone in 5 of the Spanish varieties. It is produced with much less frequency, but this is potentially influenced by the discourse that the speakers were asked to produce. In other words, the need for a LH% may have been less given the content of the written text. This boundary tone did not occur in any of the utterances produced by Colombian, Costa Rican, and Puerto Rican speakers. It is possible that this mid rising edge tone is not in the inventory of boundary types in these three dialects suggesting that boundary tone inventories may differ among Spanish dialects.

We did not analyze the juncture type where boundary tones occurred for each dialect group. We do not know, for example, if a LH% was produced at the same junctures for speakers using different dialects. Therefore, we cannot suggest that each of the boundary tones has the same function in each of the dialects. We only suggest that the inventory of boundary tones may be different among the dialects that we observed.

Figure 15. The frequency and type of edge tone in productions speakers of 8 Spanish dialects.

5. Conclusion

The present investigation has four
whose distribution varies within each
pitch patterns within utterance final w
of tone targets under conditions of ton
three accent types: a L+H* pitch ac
within the stressed syllable, a L*+H i
poststressed syllable, and a H+L* pit
stressed syllable with a H target at th
realized near the end of the stressed
combination of pitch accents was a l
accents occurred in other combinati
nuclear L+H* were the most frequen
unable to isolate tone targets within th
of the productions for most of the spe
words need to be produced with pitch

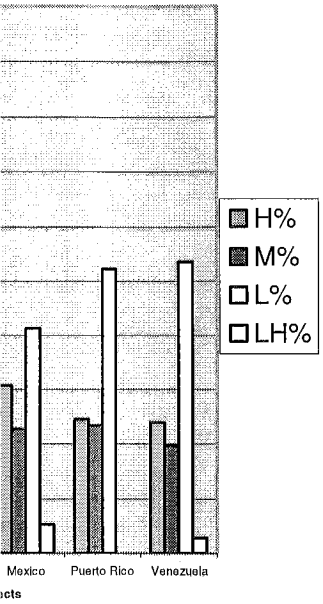
There were also differences amo
inventories are not the same among S
found in productions by Chilean and
dialects, L*+H L+H* was used most
more likely to produce a nuclear H+
more likely to use a prenuclear L+H*
that the tune L*+H L+H* L% has bee
Spanish (ToBI Workshop 1999) and v
that we analyzed.

The results of this investigation
with multiple edge tone types, and tha
structure of the discourse. Speakers
finality at the edge of informationally
exclusively at the end of complete id
When the edge of a syntactically com
speakers were less likely to use or
including H%, L%, and M% were p
boundary tone, one that has not been
intonation. This category type did no
indicating that either the LH% boun
dialects, or that the discourse that we a

ory of boundary types in these 8

sults is the existence of the LH%
s. It is produced with much less
by the discourse that the speakers
eed for a LH% may have been less
undary tone did not occur in any of
Rican, and Puerto Rican speakers.
s not in the inventory of boundary
it boundary tone inventories may

where boundary tones occurred for
mple, if a LH% was produced at the
it dialects. Therefore, we cannot
the same function in each of the
of boundary tones may be different



tone in productions speakers of 8

5. Conclusion

The present investigation has found multiple pitch accents types in Spanish, whose distribution varies within each dialect. When examining the alignment of pitch patterns within utterance final words, consistent differences in the location of tone targets under conditions of tonal crowding indicate that there are at least three accent types: a L+H* pitch accent is produced with an accentual peak within the stressed syllable, a L*+H is produced with an accentual peak in the poststressed syllable, and a H+L* pitch accent is produced as a fall within the stressed syllable with a H target at the onset of the stressed followed by a fall realized near the end of the stressed syllable. The most frequently occurring combination of pitch accents was a L*+H followed by a L+H*. These pitch accents occurred in other combinations as well, but prenuclear L*+H and nuclear L+H* were the most frequently used pitch accents. Finally, we were unable to isolate tone targets within the final and prefinal content words in some of the productions for most of the speakers and we suggest that not all content words need to be produced with pitch accents.

There were also differences among dialects suggesting that pitch accent inventories are not the same among Spanish dialects. Notable differences were found in productions by Chilean and Peninsular speakers. For the majority of dialects, L*+H L+H* was used most often. However, Chilean speakers were more likely to produce a nuclear H+L* accent and Peninsular speakers were more likely to use a prenuclear L+H* pitch accent. This was surprising, given that the tune L*+H L+H* L% has been described as prototypical for Peninsular Spanish (ToBI Workshop 1999) and was never used by the Peninsular speakers that we analyzed.

The results of this investigation also reveal that declaratives are produced with multiple edge tone types, and that boundary tone choice is affected by the structure of the discourse. Speakers used an L% boundary tone indicating finality at the edge of informationally complete utterances. It was used almost exclusively at the end of complete ideas and at the end of the entire passage. When the edge of a syntactically complete unit was informationally incomplete, speakers were less likely to use only a L% and multiple boundary types including H%, L%, and M% were produced instead. We also found a LH% boundary tone, one that has not been mentioned in previous analyses of Spanish intonation. This category type did not occur in the productions of all dialects indicating that either the LH% boundary tone is part of only some Spanish dialects, or that the discourse that we analyzed did not require its use.

References

Face, Timothy. 2000. Prosodic manifestation of focus in Spanish. *Southwest Journal of Linguistics* 19(1), 45-62.

Face, Timothy. (in press). Focus and early peak alignment in Spanish intonation. To appear in *Probus* 13.

Grosz, Barbara. and Candace Sidner. 1986. Attention, Intentions, and the Structure of discourse. *Computational Linguistics* 12:3.

Hualde, José Ignacio. 2000. Intonation in Spanish and the other Ibero-Romance languages: Overview and status quaestionis. Paper presented at the 30th Linguistic Symposium on Romance Languages, Gainesville, Florida.

Ladd, Robert. 1996. *Intonational phonology*. Cambridge, UK: Cambridge University Press.

Mendoza-Denton, Norma, Julia McGory and Manuel Díaz-Campos. 1999. Minutes from the first Spanish ToBI workshop. www.ling.ohio-state.edu/~tobi/sp-tobi/SP-TOBI.wkshp.minutes.html.

Navarro-Tomás, Tomás. 1948. *Manual de entonación española*. New York: Hispanic Institute in the United States.

Navarro-Tomás, Tomás. 1967. *Manual de pronunciación española*. Madrid: Consejo Superior de Investigaciones Científicas.

Nibert, Holly. 1999. A perception study of intermediate phrasing in Spanish intonation. In Javier Gutiérrez-Rexach & Fernando Martínez-Gil, eds., *Advances in Hispanic Linguistics*, 231-247. Somerville: Cascadilla Press.

Nibert, Holly. 2000. Phonetic and phonological evidence for intermediate phrasing in Spanish intonation. Doctoral dissertation, University of Illinois, Urbana-Champaign.

Pierrehumbert, Janet. 1980. The phonology and phonetics of English intonation. PhD dissertation, MIT.

Prieto, Pilar. 1998. The scaling of L values in Spanish downstepping contours. *Journal of Phonetics* 26, 261-282.

Prieto, Pilar, Chilin Shih and Holly Nibert. 1996. Pitch downtrend in Spanish. *Journal of Phonetics* 24, 445-473.

Prieto, Pilar, Jan van Santen and Julia Hirschberg. 1995. Tonal alignment patterns in Spanish. *Journal of Phonetics* 23, 429-451.

Sosa, Juan Manuel. 1999. *La entonación del español*. Madrid: Cátedra.

Competence and Perform
Monolinguals and 2nd Ge
Tense/Aspe

Silvina
University of Illinois a

1. Introduction

It has long been observed in the so generation Spanish-English bilinguals in of language abilities—in many areas of syntax, morphology, and pragmatics. nominal and verbal inflections (gender, most vulnerable to morphological eros According to Lipski (1993), Spanish-E usually produce errors similar to those o of Spanish, yet they appear to have high domains, similar to that of Spanish nati observed that many aspects of first lang in production (Andersen, 1982; Dorian Smith, 1983). Confirming these ob performance errors, Silva Corvalán (Imperfect morphological distinction b generation bilinguals, with particular si with stative verbs; and Zentella (1997 Imperfect tense in the speech of five 2 New York City area, and concluded tha was very different from that of mono deficits can also show up in comprehe well (Seliger 1996, Sharwood Smith 1 potential erosion of the Preterite/Imp generation bilinguals from the perspecti of characterizing in more formal terms performance of bilingual speakers (see a similar approach).

Within current grammatical theory has been made between functional an include verbs, nouns, adjectives, adverb instantiate inflectional morphology or and present tense morphemes *-ed*, *-s*, pr and number agreement marker *-s*, relati encode the functional (or grammatic inflectional morphemes, including ten

 Structure, Meaning Lee et al., 93-114. Somerville, MA: Cascadi